



Medical audit

Delays in orthopaedic trauma treatment: setting standards for the time interval between admission and operation

BJA Lankester, MP Paterson, G Capon, J Belcher

Department of Orthopaedics and Trauma, Royal United Hospital, Bath, UK

Delay in operating on trauma patients leads to increased morbidity, mortality, length of hospital stay and overall cost. The urgency of operative intervention depends on the injury sustained. There are no published guidelines on what constitutes a reasonable delay between admission and operation.

As part of the clinical governance in our unit, an audit was undertaken to examine the structure and process of trauma operating. Patients were allocated to groups defined by the Bath Orthopaedic Department, according to urgency of need for surgery.

Group A: patients (for example, open fractures and dislocations) should have definitive treatment within 6 h of admission.

Group B: patients (for example, hip fractures, long bone injuries and ankle fractures) should have operations on the day that they are presented to the consultant trauma meeting, or on the day that they are declared fit/ready for theatre.

Group C: patients (for example, tendon injuries, simple hand fractures) should have operations within 5 days of presentation to the trauma meeting.

Over 3 months, there were 401 acute orthopaedic admissions requiring surgery (61 group A, 277 group B, 63 group C). 78% of group A patients, 58% of group B patients and 86% of group C patients were operated on within the target times.

In total, 137 out of 401 operations (34%) missed the targets set. 119 of these (87%) were delayed due to lack of available operating time. This was despite the fact that 59 operations (15% of total) were done on lists normally used for elective operating. Most of the other delays were due to the need for an appropriately experienced surgeon to be available.

Correspondence to: Mr MP Paterson, Consultant Orthopaedic Surgeon, Royal United Hospital, Combe Park, Bath BA1 6DS, UK
Tel: +44 1225 428331
E-mail: benlank@globalnet.co.uk

If these targets are to be achieved for the majority of patients, the trauma theatre must become more efficient, or more flexible time must be made available during evenings or weekends to clear the backlog of trauma operations.

Key words : Trauma – Trauma lists – Emergency operating – Audit

Clinical governance imposes a responsibility on physicians to maintain good medical practice and to strive for the highest standards.¹ In order for this to be possible, explicit standards that specify 'best practice' need to be established. In orthopaedics, one particular measure is the time interval between acute admission and operation. As far as the authors are aware, there are no published guidelines as to what constitutes an acceptable time limit for the definitive treatment of injuries not requiring immediate attention.

Acute orthopaedic trauma admissions cover a very wide spectrum of injuries, often requiring surgery. Certain injuries (open fractures, dislocations, contaminated wounds, etc.) clearly benefit from urgent operative intervention to clean, debride, reduce or fix.² Other injuries, such as hip fractures and closed long bone fractures, may tolerate a certain delay, but many of these will also benefit from early surgery. In particular, elderly patients with hip fractures have reduced morbidity and mortality if treated early.³⁻⁸ A third group of injuries, such as closed tendon ruptures and simple hand fractures, rarely come to any harm if left for a few days before operative treatment, but should still have surgery within a finite and optimal period.

Even if there is no measurable detrimental effect on outcome, delays between the time of admission and operation may lead to significant pain and frustration for patients and relatives, and inevitable increased length of stay and cost of care.

This paper sets out our own standards for maximum time intervals between admission and operation across the whole range of orthopaedic trauma admissions.

We present the results of a 3 month prospective audit, carried out to ascertain in what proportion of patients we achieved these standards.

Patients and methods

The Orthopaedic Department at the Royal United Hospital admits patients with a wide variety of musculoskeletal injuries. The number of trauma admissions is rising each year by approximately 10%. Only a very small number of patients are transferred to other hospitals as tertiary referrals for operative management not available in Bath.

All patients admitted over a 24 h period are presented at a daily 0800 am trauma meeting, and a decision is made concerning their need for operative care. An operating list for that day is finalised.

There is a daily theatre list, dedicated to orthopaedic trauma, from 0830 to 1630, Monday to Friday. Outside these hours and at weekends, theatre and anaesthetic staff cover all of the acute surgical specialities, and the management of orthopaedic trauma depends on overall clinical priority. Emergency operations are done at the earliest opportunity, but routine or less urgent trauma cases often get delayed treatment, due to the limited operating time.

The eight consultant orthopaedic surgeons in the department agreed on three categories of trauma admissions, and grouped them as shown in Table 1. The

Table 1 The three categories of trauma admissions

Group A	<ul style="list-style-type: none"> Open fractures Any dislocation Any fracture – dislocation Compartment syndrome Supracondylar fractures with neurovascular compromise Femoral neck fracture (child) Subcapital femoral neck fractures in adults under 60 years Re-implantation Mangled hand Severe infection Osteitis/septic arthritis Cauda equina compression Contaminated traumatic wounds
Group B	<ul style="list-style-type: none"> Most fractured neck of femurs Wrist fractures Ankle fractures when ready Closed long bone injuries Simple clean wounds Spinal tumours with neurology Spinal fractures with neurology Other injuries not included in groups A or C
Group C	<ul style="list-style-type: none"> Re-manipulation of a fracture Locked knees Sciatica Spinal tumour/fracture without neurology Peri-prosthetic fracture Ruptured Achilles tendon/quadriceps tendon Hand injuries – simple fractures, simple tendon injuries, simple nerve injuries

list is not exhaustive, but should be used as a guideline. The standards used for the audit were as follows.

Group A

Group A patients should be operated on within 6 h of admission.

Group B

Group B patients should be operated on by the end of the day on which they are presented to the consultant at the trauma round. This usually means the day after admission. If the patient has been unfit for anaesthetic, or not ready for theatre (*e.g.* ankle too swollen), then the time interval is taken from the day that the patient is declared fit/ready for theatre.

Group C

Group C patients should be operated on within 5 days of presentation to the trauma round.

Patients were allocated prospectively to groups during the daily trauma round. If there was any doubt, then the decision was made by the consultant present. The senior sisters in the trauma unit (GC and JB) collated a list of all the admissions over a 24 h period, with the intended operation and allocated group. They also completed another list of all patients waiting for operations, including the reasons for any delay.

A database was constructed from these details, and the results audited over a 3 month period.

Results

Over 91 days, there were a total of 510 acute admissions

to the trauma unit, of which 401 (79%) required operations, and were entered into the database (61 group A, 277 group B, 63 group C – 15%, 69% and 16%, respectively); 36 of the 401 patients (9%) required more than one operation, but only their first visit to the operating theatre was included.

Of the 401 trauma operations, 65 (16%) were done 'out-of-hours' (after 1700); 59 operations (15%) were done in theatres allocated to elective surgery. These were either on lists set aside for trauma cases (the consultant on-call that week usually had his routine elective list left open to do trauma), or on lists created by cancellation of elective cases because of the excessive trauma workload. During the period of the audit, 22 elective operations were cancelled for this reason.

In group A, 48 out of 63 operations (78 %) were done within 6 h of admission (Fig. 1). Most operations that were not performed within the target time were delayed because of other emergency operations taking place in theatre. Of note, all open fractures were taken to theatre within 6 h.

In group B, 162 out of 277 operations (58%) were done within the target time (Fig. 2). Of the 115 operations that were delayed in group B, 104 (90%) were due to lack of theatre time. Most of the rest were due to waiting for an appropriately experienced surgeon to be available.

In group C, 54 out of 63 operations (86%) were done within the target time (Fig. 3). The majority of the patients who waited longer than 5 days for operations had peri-prosthetic fractures, and were waiting for an appropriately experienced surgeon or a custom-made prosthesis.

The 9 operations that missed the target in this group were done between the 6th and the 13th day after presentation.

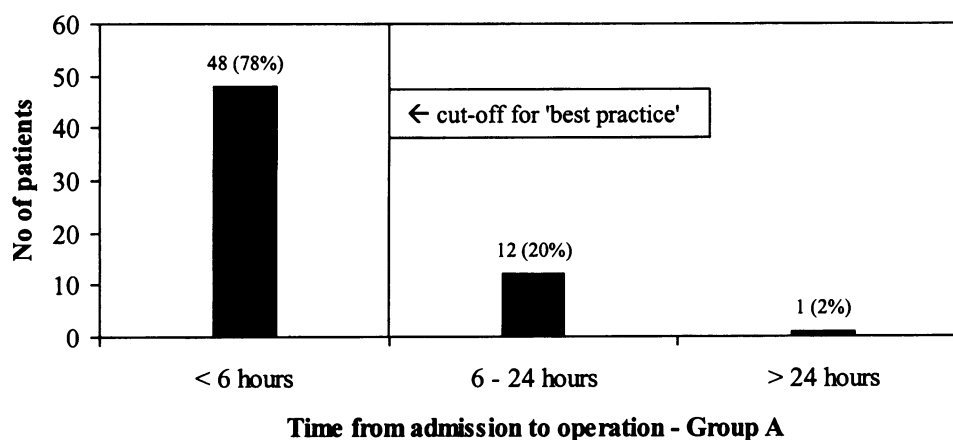


Figure 1 Time from admission to operation for group A patients

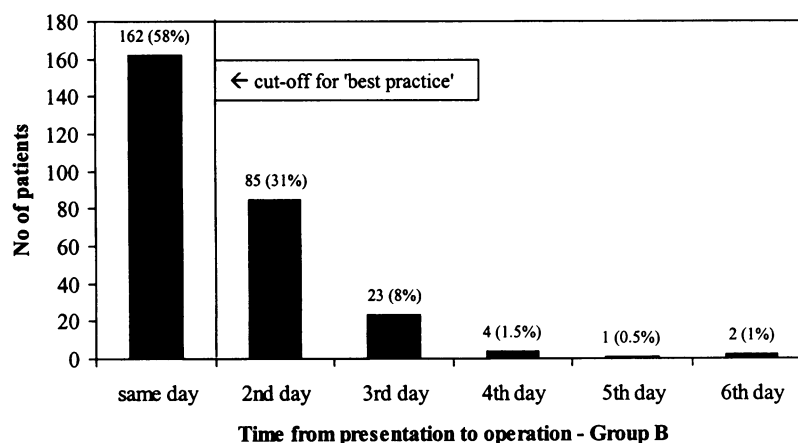


Figure 2 Time from admission to operation for group B patients

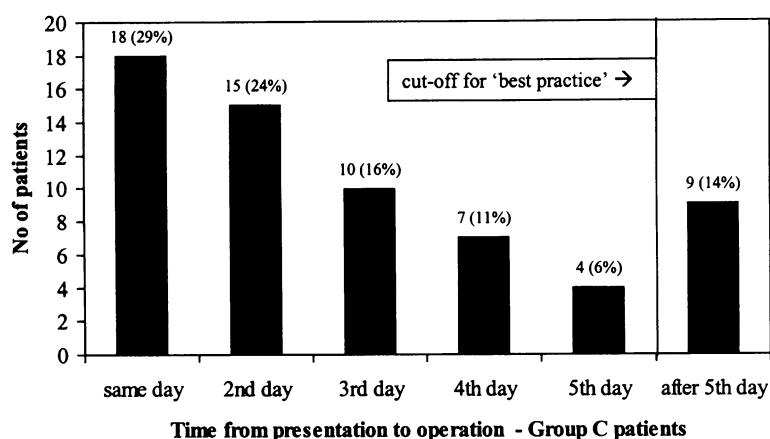


Figure 3 Time from admission to operation for group C patients

Discussion

We have allocated patients into groups in an attempt to process trauma admissions in an organised fashion. The time limits chosen as standards are essentially arbitrary, but represent a consensus opinion as to what we consider to be 'best practice'.

In total, 137 of the 401 operations (34%) were delayed beyond the target time. The reasons for the delays were varied, but the most common and important was lack of available theatre time. In group B (the group that included 69% of all the patients), 90% of the 115 delays were due to lack of theatre time.

Patients with hip fractures fared particularly badly. Of those in group B (*i.e.* requiring DHS fixation or hemiarthroplasty), only 48% of 125 operations were done within the target time. This was worse than the average for the group. These patients have been shown above all others to benefit from early fixation with

lower morbidity, shorter hospital stay and decreased mortality at 6 months.³⁻⁸

If theatre efficiency cannot be improved, then more theatre time is needed for operating on trauma admissions. The extra time needs to be flexible, as the demand varies from week to week. We have considered extra time during evenings and dedicated lists at the weekend, but both of these have significant implications both financially and for theatre personnel (surgical, anaesthetic, nursing and CSSD).

Conclusions

This audit shows that the current practice in Bath falls short of the standard that we would consider ideal. Within the current framework, it is open to debate precisely what percentage achievement of these standards would be a reasonable aim.

Clinical governance involves a dual responsibility – of the clinician to maintain high standards and of management to provide adequate resources.¹ Unless more theatre time is made available for trauma operating, the only way to improve our trauma practice is to cancel elective operations, which is unsatisfactory for both surgeons and managers alike.

Acknowledgement

We would like to thank all of the orthopaedic consultants in Bath for allowing us to include their patients in this series.

References

1. Royal College of Physicians. Physicians maintaining good medical practice : clinical governance and self-regulation. London: Royal College of Physicians, 1999.
2. Gustilo RB, Merkow RL, Templeman D. The management of open fractures. *J Bone Joint Surg Am* 1990; **72**: 299–304.
3. Villar RN, Allen SM, Barnes SJ. Hip fractures in elderly patients operative delay versus prognosis. *BMJ* 1986; **293**: 1203–4.
4. Sexson SB, Lehner JT. Factors affecting hip fracture mortality. *J Orthop Trauma* 1987; **1**: 298–305.
5. Fox HJ, Pooler J, Prothero D, Bannister GC. Factors affecting the outcome after proximal femoral fractures. *Injury* 1994; **25**: 297–300.
6. Rogers FB, Shackford SR, Keller MS. Early fixation reduces morbidity and mortality in elderly patients with hip fractures from low-impact fall. *J Trauma* 1995; **39**: 261–5.
7. Zuckerman JD, Skovron ML, Koval KJ, Aharonoff G, Frankel VH. Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. *J Bone Joint Surg Am* 1995; **77**: 1551–6.
8. Holt EM, Evans RA, Hindley CJ, Metcalfe JW. 1000 femoral neck fractures: the effect of pre-injury mobility and surgical experience on outcome. *Injury* 1994; **25**: 91–5.